Process Component ATP Requests [LFM]

Component ATP requests 32 from fulfillment server 16 are received at each of the appropriate LFMs 22. As discussed above, a LFM 22 is generally responsible for managing component ATP requests 32 and communicating between fulfillment server 16 and associated ATP server 14 over the life of ATP request 30. In one embodiment, LFM 22 is involved in quotation, promise, acceptance, shipping, and archive operations for associated ATP server 14. If specified sourcing preferences exist, component ATP requests 32 may include this information, such that LFMs 22 may identify and process component ATP requests 32 accordingly. If there are no specified sourcing preferences, LFMs 22 may be capable of identifying relevant component ATP requests 32 based on the user, customer, or product. At a particular ATP server location, LFM 22 receives component ATP request 32 and generates a quotation request to ATP server 14 using the command syntax suitable for the particular associated planning engine. As part of this processing, LFM 22 evaluates the business constraints encapsulated in component ATP request 32 and acts accordingly.

Planning engines may vary relative to the requirements of this interface. As an example, FP engines typically do not maintain ATP from which request transactions will consume allocated product availability. Each component request is planned against a representation of finished goods inventory, available materials or capacity, and other suitable factors to determine product availability. There may be little functionality for controlling the output structure of the resulting quotation response from the standpoint of shipment timing and lot sizing. In this situation, LFM 22 may submit the quotation request as a planning transaction and evaluate the quotation response according to the business constraints encapsulated in component ATP request 32. If the response from ATP server 14 does not meet these requirements, LFM 22 identifies this and sends a failure notification to fulfillment server 16.

For example, if the *ship complete* attribute within component ATP request 32 requires the request to be met in full, and the availability in ATP server 14 was less than the *requested quantity* attribute, then LFM 22 might indicate the component quotation 34 as having failed and provide an appropriate descriptive failure

annotation. This front-line evaluation may be important since, depending on the planning engine, the ATP server response may be multi-dimensional (offering multiple options). Providing response evaluation at the LFM level rather than at the fulfillment server level allows failure conditions to be identified and summarized before component quotations 34 are sent back to fulfillment server 16, thereby reducing overall network load.

As an example of a multi-dimensional ATP server response, consider a given request line item (e.g., 100 wheels on May 8), for which the response might be that 60 wheels are available on May 8 for $22, and/or 30 wheels on May 10 for $16, and/or 100 wheels on May 12 for $16. These are multiple options for the line-item quote. System 10 may allow for the incorporation of rules and ranges. For example, the ability to take 30 wheels on May 10 and the remaining 70 wheels on May 12 may be constrained if the option for $16 on May 12 includes a quantity restriction inconsistent with this.

As a further example, consider a three line-item request (e.g., 100 wheels, 25 simple axles, and 25 complex axles delivered proportionally on May 8). Individual line-item quotes can be computed as above, with multiple options, then combined in some suitable manner. For example, the simple axles might be available on May 9, 15 units, and May 11, 25 units, for $10. The complex axles might be available on May 8, 10 units, and May 10, 25 units, for $25. Ignoring the proportionality business constraint included in the request, delivery of products satisfying the order might occur over several days, May 8 through May 12, as appropriate. A proportionality business constraint, however, might mandate that line-items only be delivered in amounts proportional to how they were requested, since for example it may do no good to be delivered wheels if no axles are delivered. The above might result in the following example multi-dimensional quote that includes multiple line-item quotes and obeys an example proportionality business constraint:

May 9 -- 40 wheels, 10 of each axle, for $(22*40 + 10*10 + 25*10)
May 10 - 28 wheels, 7 of each axle, for $(16*28 + 10*7 + 25*7)
May 10 - 60 wheels, 15 of each axle, for $(16*30 + 22*30 + 10*15 + 25*15)
May 11 - 88 wheels, 22 of each axle, for $(16*30 + 22*58 + 10*22 + 25*22)

May 12 - 100 wheels, 25 of each axle, for $(16*100 + 10*25 + 25*25)

In one embodiment, system 10 supports many different business constraints, some of which may need one or more extra fields to be specified. To model this, the business constraint field could be an extension selector, as described in U.S. Patent Nos. 5,764,543 and 5,930,156, both of which are incorporated by reference herein. Additional extension fields might become operative when a corresponding extension value is inserted into the extension selector field. For example only and not by way of limitation, a maximum variance constraint might be specified on ATP request 30 and an additional field added to the request model called *max_variance_percentage* that allows the client 12 or an associated user to specify the amount of variance from a requested quantity that will be tolerated. That field may not exist and may not take up any memory space when the maximum variance constraint is not specified. System 10 may allow such an extensible model or capability to be used with respect to any or all business constraints described herein, providing significant flexibility and an important technical advantage over flat or other previous modeling techniques.

Within system 10, various LFMs 22 may compute a variety of partial quotations or partial promises, for example, containing no detail of supply availability. When this occurs, fulfillment server 16 may be tasked with creating a combined promise using the partial quote information. Worse, since the LFMs 22 may be backed by inferior ATP servers 14 incapable of providing suitably rich ATP information, fulfillment server 16 may need to deal with a varied sophistication of component quotations or component promises and still form the best possible quotations or promises for ATP request 30 as a whole. Performing this task properly may require any number of business constraints to drive the interpretation of the various component quotations or component promises, or to mutate the various component quotations or component promises as appropriate. Extensibility within the models representing LFMs 22 allows different constraints for mutating component quotations or component promises to be modeled. The present invention contemplates extensibility with respect to any suitable business constraints described herein.